Starters - New Beetle

DESCRIPTION

Starter is a brush type, series-wound electric motor with an overrunning clutch. Field frame is enclosed by commutator end frame and drive bushing, and carries pole shoes and field coils. A splined armature shaft drive end carries drive assembly.

TROUBLE SHOOTING

NOTE: See TROUBLE SHOOTING article in GENERAL INFORMATION.

PRELIMINARY INSPECTION

Verify customer complaint by operating system. Visually inspect for obvious signs of mechanical and electrical damage. Inspect for blown fuses and damaged relays. Inspect for loose or corroded connections, damaged wiring harnesses and/or switches. Check for a broken or partially broken wire inside insulation, which could cause system malfunction but prove good in a continuity/voltage check with system disconnected. Ensure any aftermarket electronic equipment is properly installed. If fault is found, repair as necessary.

ON-VEHICLE TESTING

NOTE: Starter is actuated through immobilizer system. Ensure immobilizer system is operating properly.

STARTER DOES NOT CRANK ENGINE

NOTE: On vehicles with automatic transmission, ensure park/neutral switch is operating properly.

Starter does not crank

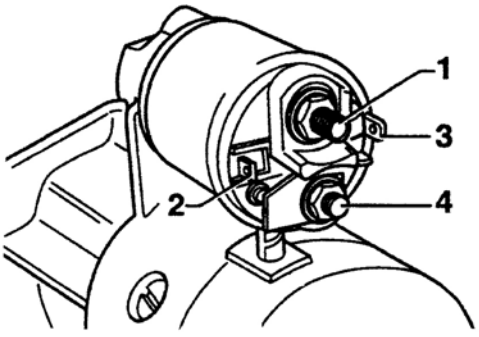
Prerequisite:

- Battery voltage OK.
- Starter solenoid terminals and ground strap connections between engine, body and battery must be tight and must not be corroded/oxidized.

Required for troubleshooting:

- *SUn VAT 40 or Multimeter Fluke 83*
- *Connector kit VW 1594*
- *Valid wiring diagram*

1 - Terminal 30 - from battery
2 - Terminal 50 - from ignition starter switch
3 - Terminal 15a
4 - Connection for field windings



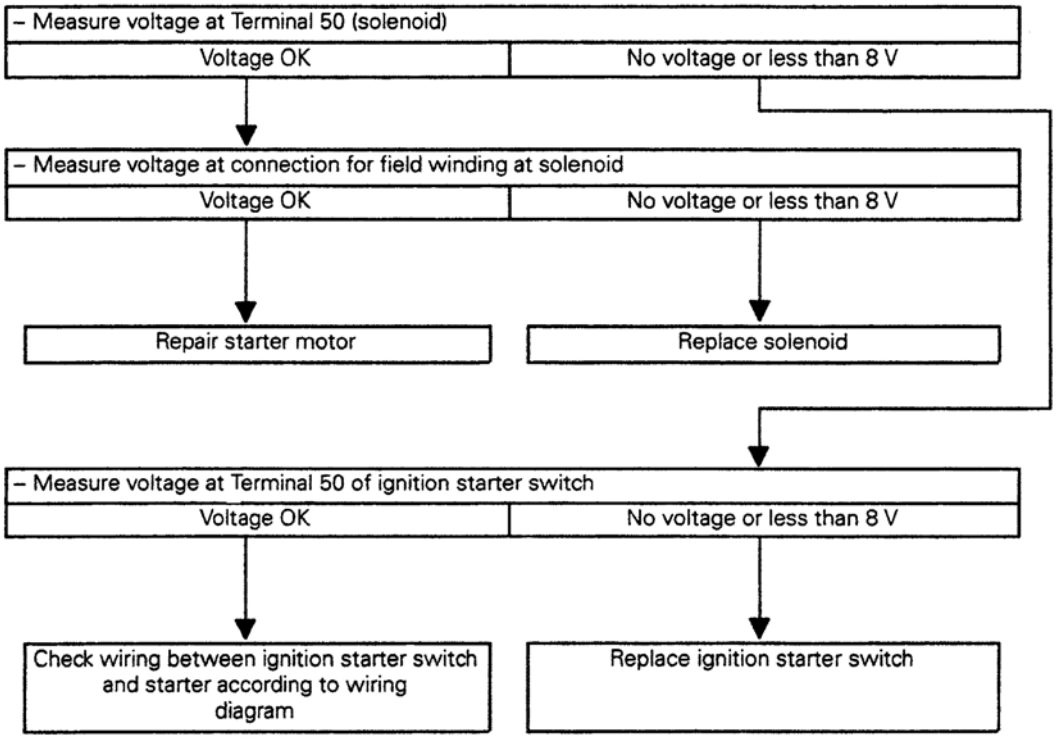

– Measure voltage at Terminal 50 (solenoid)
Voltage OK
No voltage or less than 8 V
– Measure voltage at connection for field winding at solenoid
Voltage OK
No voltage or less than 8 V
Repair starter motor
Replace solenoid
– Measure voltage at Terminal 50 of ignition starter switch
Voltage OK
No voltage or less than 8 V
Check wiring between ignition starter switch and starter according to wiring diagram
Replace ignition starter switch
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Fig. 1: Testing Starter Circuit
Courtesy of VOLKSWAGEN UNITED STATES, INC.

STARTER CRANKS TOO SLOWLY TO START ENGINE

Ensure battery is fully charged. Check for excessive voltage drop due to loose or corroded connections. Ensure electrical and ground connections are clean and tight. If necessary, clean and tighten ground strap between transmission and body. DO NOT loosen ground strap on body. If starter still turns slowly, repair or replace starter.

REMOVAL & INSTALLATION

WARNING: Vehicles are equipped with air bag supplemental restraint system. Before attempting any repairs involving steering column, instrument panel or related components, see SERVICE PRECAUTIONS (or AIR BAG SAFETY PRECAUTIONS) and DISABLING & ACTIVATING AIR BAG SYSTEM in appropriate AIR BAG RESTRAINT SYSTEMS article.

CAUTION: Turn ignition off. Before disconnecting negative battery terminal, obtain anti-theft radio security code. Disconnect negative battery terminal. After reconnecting battery, re-code and check operation of anti-theft radio.

BATTERY DISCONNECT PRECAUTIONS

CAUTION: Turn ignition off. Before disconnecting negative battery terminal, obtain anti-theft radio security code. Disconnect negative battery terminal. After reconnecting battery, re-code and check operation of anti-theft radio.

If the connector is disconnected from the ECM or the battery is disconnected, all adaptation values in the control module are erased. DTC memory content will remain intact however. If the engine is started after this, a rough, uneven idle can result. In this case, engine must be allowed to run at idle for a few minutes or a longer road test must be performed until the adaptation procedure has been completed.

Once battery has been connected, check operation of radio, clock and convenience electronics. Completely open and close all power windows.

NOTE: Vehicles with On Board Diagnostics (OBD) II must have readiness code for Electronic Control Module (ECM) re-generated after battery has been disconnected. See appropriate SELF-DIAGNOSTICS article in ENGINE PERFORMANCE.

STARTER

Removal & Installation

1. Disconnect negative battery cable. Raise and support vehicle. Remove noise insulation panel. See **Fig. 2** or **Fig. 3** . Remove insulation cover. See **Fig. 4** .
2. Remove power steering line retaining bracket. See **Fig. 5** . Remove battery, where applicable. Remove bolts, and battery carrier. See **Fig. 6** .
3. Separate electrical connections, and remove from retainer. Disconnect starter electrical connections.

Remove starter wiring from guides. Remove guides.

4. Remove coolant hose from retainer. Remove coolant hose retainer. See **Fig. 7** . Remove bolts securing starter. Remove starter. To install, reverse removal procedure. Tighten starter mounting bolt/nuts to specification. See **TORQUE SPECIFICATIONS** .

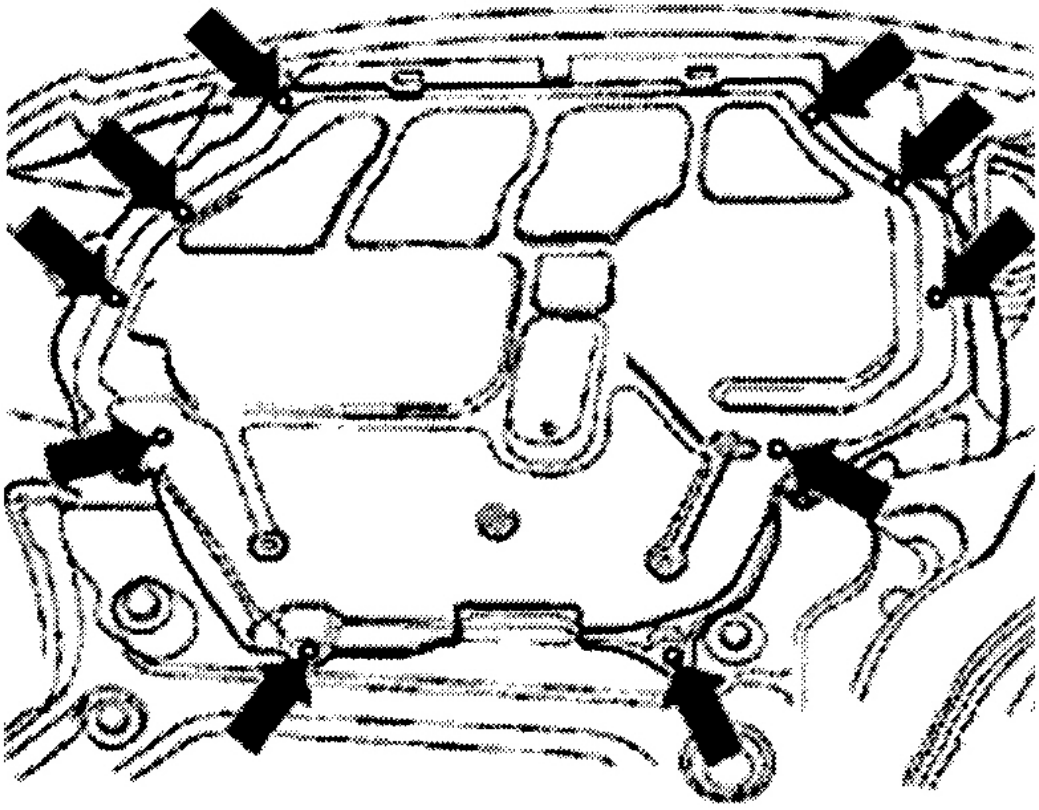

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Fig. 2: Identifying Noise Insulation Mounting Points (1.9L TDI)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

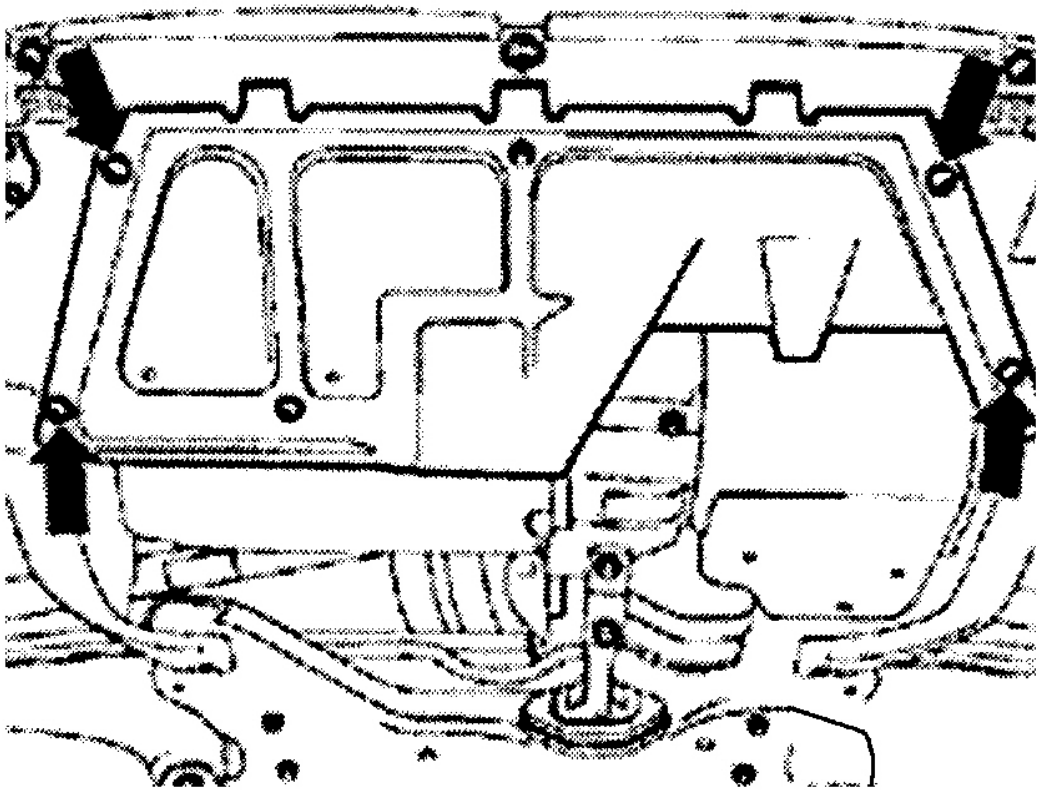

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Fig. 3: Identifying Noise Insulation Mounting Points (1.8L & 2.0L)
Courtesy of VOLKSWAGEN UNITED STATES, INC.

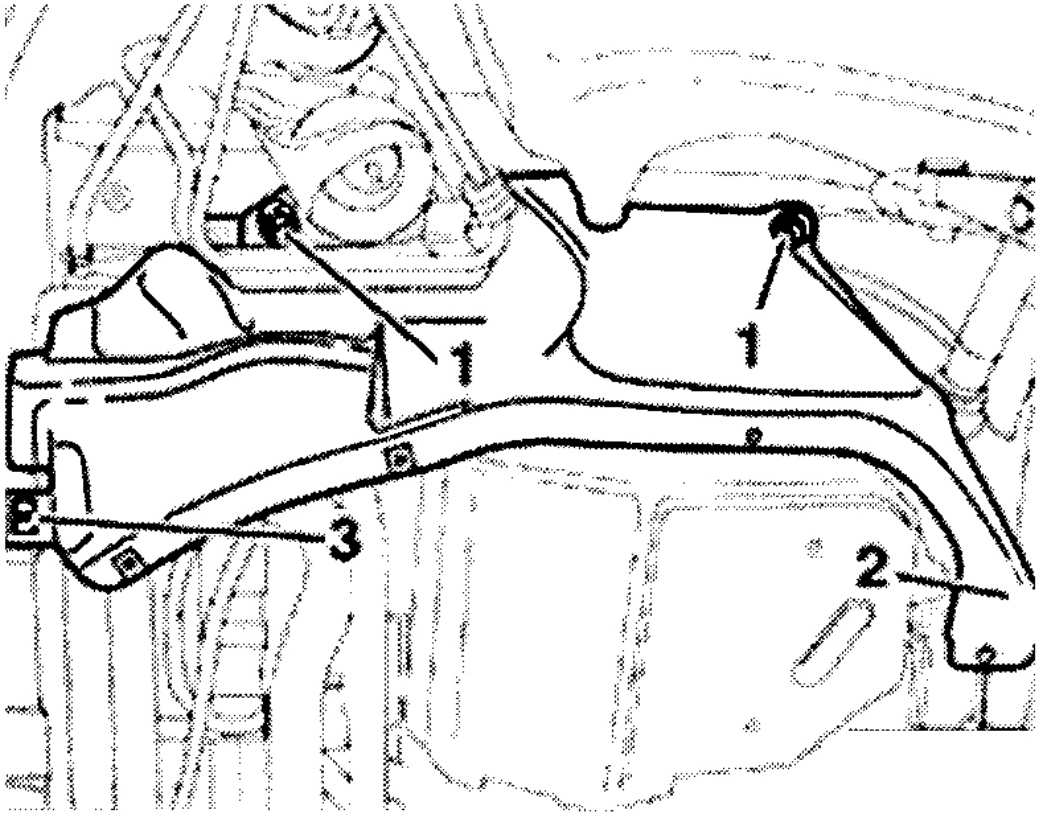

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Fig. 4: Identifying Insulation Cover Mounting Points
Courtesy of VOLKSWAGEN UNITED STATES, INC.

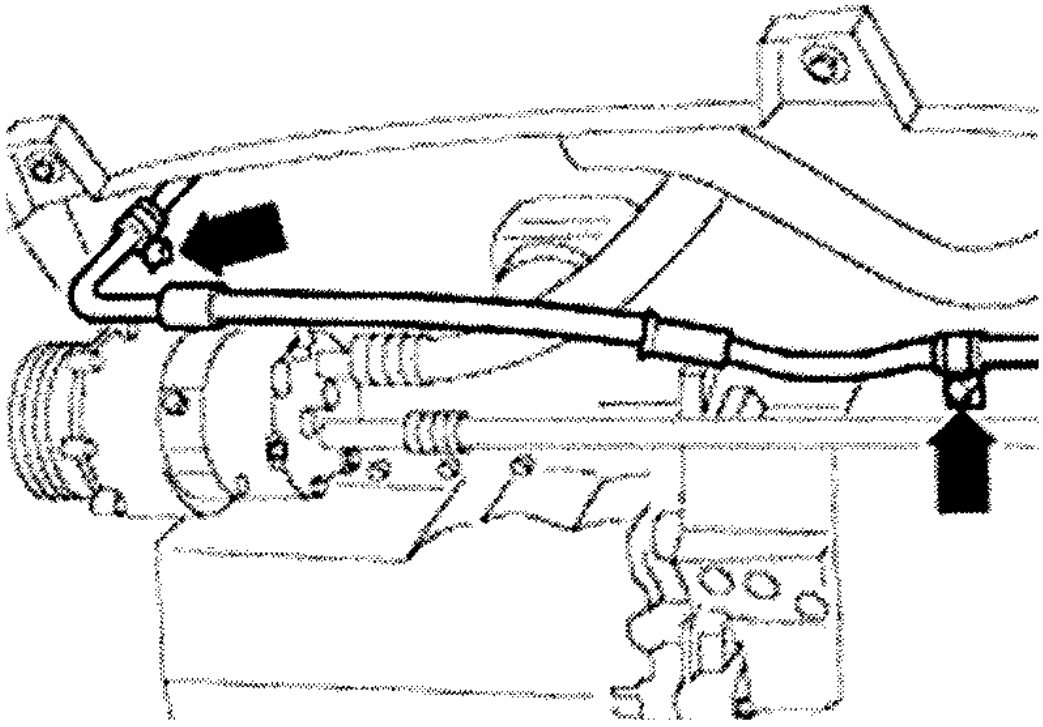

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Fig. 5: Identifying Power Steering Line Retainer Locations
Courtesy of VOLKSWAGEN UNITED STATES, INC.

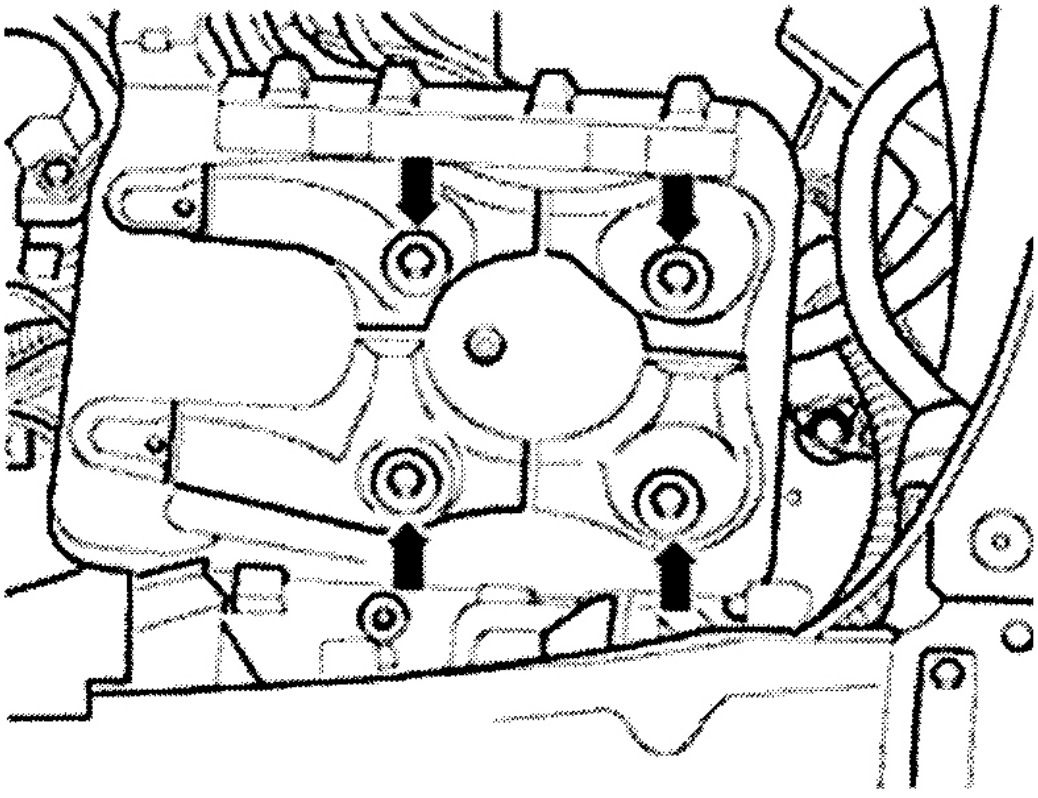

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Fig. 6: Identifying Battery Carrier Mounting Points
Courtesy of VOLKSWAGEN UNITED STATES, INC.

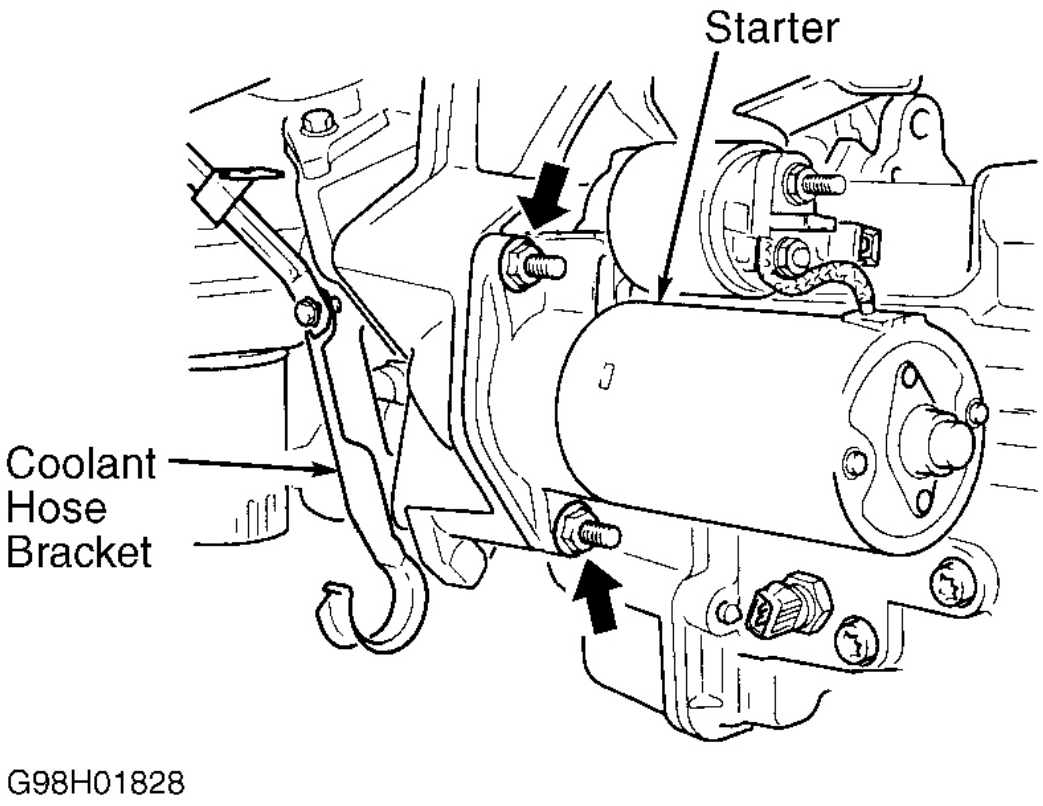

Fig. 7: Removing & Installing Starter
Courtesy of VOLKSWAGEN UNITED STATES, INC.

OVERHAUL

Manufacturer recommends replacing starter as an assembly. Exploded view and overhaul procedures are not available from manufacturer.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	**Ft. Lbs. (N.m)**
Power Steering Line Retaining Bolt	15 (20)
Starter Mounting Bolt	48 (65)
	INCH Lbs. (N.m)
Battery Carrier Bolt	53 (6)
Starter Solenoid Terminal Nut	115 (13)

WIRING DIAGRAMS

See appropriate STARTING SYSTEM wiring diagram in SYSTEM WIRING DIAGRAMS article.